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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,806	07/30/2003	Miwa Kozawa	030923	9494

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EXAMINER

LEE, SIN J

ART UNIT	PAPER NUMBER
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1752

MAIL DATE	DELIVERY MODE
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05/01/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/629,806	Applicant(s) KOZAWA ET AL.	
	Examiner Sin J. Lee	Art Unit 1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,8,9 and 12-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13 is/are allowed.
- 6) ☒ Claim(s) 1-4,8,9,12 and 14-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>2/2/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. In view of the amendment of February 2, 2007, previous 102(e) rejection over Ishibashi et al'657 is hereby withdrawn.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 1-4, 8, 9, 12 and 14-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Kanda et al (US 6,555,607 B1).

In Example 1, Kanda teaches a water-soluble resin composition (which is used in producing semiconductor devices) which contains polyvinyl alcohol (as a water soluble resin), methoxy methylated melamine (present crosslinking agent as well as present nitrogen-containing compound), 2,4,7,9-tetramethyl-5-decyne-4,7-diol polyethoxylate (present primary alcohol ethoxylate compound, present alkoxylate surfactant, and present alcohol surfactant), water and isopropyl alcohol (present alcohol solvent). Kanda applies his water-soluble resin composition onto a resist pattern (which is formed onto a silicon wafer) to prepare a water-soluble resin coating and then the contact hole resist pattern is formed (see Example 2). Therefore, Kanda teaches present inventions of claims 1-4, 8, 9 and 14-21.

With respect to present claim 12, Kanda teaches that combination of two or more water soluble resins can be used in his composition and as one of example for suitable water soluble resin, Kanda includes styrene-maleic anhydride copolymer (see col.2, lines 35-53). Based on this teaching, one skilled in the art would readily envisage using

styrene-maleic acid copolymer in addition to the polyvinyl alcohol in Kanda's Example 1 as his water soluble resins. Therefore, the prior art teaches present invention of claim 12.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-4, 8, 9, 12 and 14-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi et al (US 6,579,657 B1) in view of Mizutani et al (US 2002/0015909 A1) or Yasunami et al (US 2002/0028409 A1).

In col.2, lines 38-57, Ishibashi teaches a method for manufacturing a semiconductor device: A first resist pattern is formed from a first resist (a mixture of novolac resin and a naphthoquinonediazide photosensitive agent) on a semiconductor base layer. A second resist is formed on the first resist pattern which generates crosslinking reaction in the presence of an acid. A crosslinked film is formed at a portion of the second resist contacting with the first resist pattern by the agency of an acid fed from the first resist pattern. Non-crosslinked portions of the second resist are removed (i.e., developed) to form a second resist pattern. Finally, the semiconductor base layer is subjected to etching through the second resist pattern used as a mask.

Specifically, in his Example 11, Ishibashi teaches a second resist (which is used as a resist pattern thickening material) which contains *polyvinyl acetal* (a water-soluble resin), (N-methoxymethyl)methoxyethyleneurea (a crosslinking agent), (N-methoxymethyl) hydroxyethyleneurea (a crosslinking agent), *N-methoxymethylurea* (a

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crosslinking agent) and *pure water*. N-methoxymethylurea ($\text{NH}_2\text{-C(=O)-N(H)-CH}_2\text{OCH}_3$) also teaches present nitrogen-containing compound. Ishibashi teaches (col.9, line 6-12) that in order to improve the film-forming properties, surface active agents such as non-ionic *polyoxyethylene nonylphenyl ether type surfactant* can be added to the second resist material. Polyoxyethylene nonylphenyl ether and presently recited compounds such as polyoxyethylene alkyl ether (which is also a polyoxyalkylene alkylether compound), polyoxyethylene-polyoxypropylene condensation product, sorbitan fatty acid ester compound (which is also a fatty acid ester surfactant) are well known in the art as equivalent non-ionic surfactants as evidenced by Mizutani, [0126] or Yasunami, [0226]. Because such teachings of equivalency were known in the art at the time the invention was made, it would have been obvious to one skilled in the art to use polyoxyethylene alkyl ether, polyoxyethylene-polyoxypropylene condensation product or sorbitan fatty acid ester compound as Ishibashi's non-ionic surfactant with a reasonable expectation of improving film-forming properties of his second resist material. Thus, Ishibashi in view of Mizutani or Yasunami would render present inventions of claims 1-4, 8, 9 and 16-21.

With respect to present claim 12, Ishibashi teaches that his water-soluble resin (which examples include polyvinylacetal as well as styrene-maleic acid copolymer) for the second resist can be used singly or in combination of two or more. Based on this teaching, one skilled in the art would readily envisage using styrene-maleic acid copolymer in addition to the polyvinyl acetal in Ishibashi's Example 11 as his water

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soluble resins. Therefore, Ishibashi in view of Mizutani or Yasunami would render obvious present invention of claim 12.

With respect to present claims 14 and 15, Ishibashi teaches (col.9, lines 14-22) that the solvents for the second resist may be water and alcoholic solvents such as isopropyl alcohol. Therefore, Ishibashi in view of Mizutani or Yasunami would render obvious present inventions of claims 14 and 15.

Allowable Subject Matter

6. Claim 13 is allowed. None of the cited prior arts teaches or suggests present second resin of claim 13.

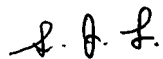
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

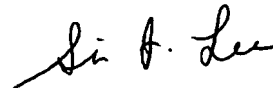
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Lee
April 28, 2007



SIN LEE
PRIMARY EXAMINER